File 155:MEDLINE(R) 1950-2006/Dec 16
(c) format only 2006 Dialog
File 73:EMBASE 1974-2007/Jan 17
(c) 2007 Elsevier B.V.
File 5:Biosis Previews(R) 1969-2007/Jan W2
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File 94:JICST-EPlus 1985-2007/Jan W2
(c)2007 Japan Science and Tech Corp(JST)
File 144:Pascal 1973-2007/Jan W1
(c) 2007 INIST/CNRS
File 34:SciSearch(R) Cited Ref Sci 1990-2007/Jan W2
(c) 2007 The Thomson Corp
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
(c) 2006 The Thomson Corp
File 35:Dissertation Abs Online 1861-2006/Nov
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File 23:CSA Technology Research Database 1963-2006/Dec
(c) 2006 CSA.
File 431:MediConf: Medical Con. & Events 1998-2004/Oct B2
(c) 2004 Dr. R. Steck
File 2:INSPEC 1898-2007/Dec W4
(c) 2007 Institution of Electrical Engineers
File 6:NTIS 1964-2007/Jan W2
(c) 2007 NTIS, Intl Cpyrght All Rights Res
File 8:Ei Compendex(R) 1884-2007/Jan W1
(c) 2007 Elsevier Eng. Info. Inc.
File 188:Health Devices Sourcebook 2004
ECRI (A nonprofit agency)
File 198:Health Devices Alerts(R) 1977-2006/Oct W2
(c) 2006 ECRI-nonprft agncy

Set	Items	Description
S1	59311	(PROSTHESIS?? OR PROSTHESES?? OR IMPLANT??? OR PROSTHETIC?-??)(5N)(LEG?? OR ARM?? OR KNEE?? OR BODY()PART?? OR HAND?? OR -LIMB?? OR FOOT?? OR FEET??)
S2	3226	(MAGNETO???? OR MAGNETIC???)(3N)(RHEOLO?????? OR RHEO()LOG-IC????)
S3	44857	SHEAR????(2N)MODE??
S4	450635	BRAKE?? OR DAMP????
S5	2680	AU=(HERR H? OR HERR, H? OR WILKENFELD A? OR WILKENFELD, A? OR BLECK O? OR BLECK, O?)
S6	0	S1 AND S2 AND S3 AND S4
S7	46	S2 AND S3 AND S4
S8	31	RD (unique items)
S9	6	S8 NOT PY>2000
S10	1	S5 AND S2

9/3,K/1 (Item 1 from file: 144)
DIALOG(R)File 144:Pascal

13301932 PASCAL No.: 98-0025737
Design rules for MR fluid actuators in different working modes
Passive damping **and isolation : San Diego CA, 3-4 march 1997**
BOELTER R; JANOCHA H
DAVIS L Porter, ed
University of Saarland, Laboratory for Process Automation (LPA) PO Box 15 11 50, 66041 Saarbruecken, Germany
International Society for Optical Engineering, Bellingham WA, United States.
Passive damping and isolation. Conference (San Diego CA USA) 1997-03-03
Journal: SPIE proceedings series, 1997, 3045 148-159
Language: English

Passive damping **and isolation : San Diego CA, 3-4 march 1997**
... determined by a variety of parameters. The magnetorheological properties of the MR suspension, the working **mode** (**shear mode** , flow **mode** , squeeze mode) and the design of the magnetic circuit consisting of MR fluid, flux guide...
... in the three working modes was investigated by using a rotational viscometer, a flow mode **damper** and a new measuring technique working in the squeeze mode. The measurement results for various...

... densities are reported and the results of the different working modes are compared. High dynamic **damping** forces dependent on the magnetic field can be achieved especially in the squeeze mode . The...

English Descriptors: Vibration control; Clutch; Vibration **damper** ; **Rheology** ; **Magnetic field** ; Theoretical study; Magnetic circuit; Experimental study

9/3,K/2 (Item 1 from file: 23)
DIALOG(R)File 23:CSA Technology Research Database

0005943401 IP ACCESSION NO: A00-31468
Analysis of electro- and magneto - rheological **flow mode** dampers **using Herschel-Bulkley model**

Lee, Dug-Young; Wereley, Norman M
Taegu Univ., Kyungsan, Republic of Korea [Lee]

PAGES: 244-255
PUBLICATION DATE: 2000

PUBLISHER: Bellingham, WA: Society of Photo-Optical Instrumentation Engineers (SPIE Proceedings. Vol. 3989)

CONFERENCE:
Smart structures and materials 2000 - Damping and isolation; Proceedings of

the Conference, Newport Beach, CA, UNITED STATES, 6-8 Mar. 2000

DOCUMENT TYPE: Conference Paper
RECORD TYPE: Abstract
LANGUAGE: ENGLISH
NUMBERS: Contract: NSF CMS-97-34244; A00-31447 08-37; SPIE-3989
FILE SEGMENT: Aerospace & High Technology

Analysis of electro- and magneto - rheological **flow mode** dampers **using Herschel-Bulkley model**

ABSTRACT:
Electrorheological (ER) and magnetorheological (MR) fluid-based **dampers** are typically analyzed using Bingham-plastic shear flow analysis under quasi-steady fully developed flow...

...by measurements reported in the literature, is to allow for post-yield shear thinning and **shear** thickening. To **model** these, the constant post-yield plastic viscosity in Bingham model can be replaced with a power law **model** dependent on **shear** strain rate that is known as the Herschel-Bulkley fluid model. Depending on the value...

...of post-yield shear thickening or thinning behavior can be analyzed. A nominal ER bypass **damper** is considered. **Damping** forces in the **damper** are analyzed by approximate parallel plate geometry. The impacts of flow behavior index on shear...

...strain relationship and velocity profile for variable electric field are also examined numerically. Then, analytical **damping** predictions of ER/MR flow mode **dampers** are compared using the nonlinear Bingham-plastic and nonlinear Herschel-Bulkley analyses. (Author)

DESCRIPTORS: *Vibration isolators; *Electrorheological fluids; *Magnetorheological fluids; *Mathematical **models** ; * **Shear** strain; Parallel plates; Stress-strain relationships; Velocity distribution

9/3,K/3 (Item 1 from file: 2)
DIALOG(R)File 2:INSPEC

07698478 INSPEC Abstract Number: A2000-20-4660H-004, C2000-10-3260N-017
Title: Analysis of electro- and magneto - rheological **flow mode** dampers **using Herschel-Bulkley model**
Author(s): Dug-Young Lee; Wereley, N.M.
Author Affiliation: Sch. of Autom. Eng., Taegu Univ., South Korea
Journal: Proceedings of the SPIE - The International Society for Optical Engineering Conference Title: Proc. SPIE - Int. Soc. Opt. Eng. (USA) vol.3989 p.244-55
Publisher: SPIE-Int. Soc. Opt. Eng,
Publication Date: 2000 Country of Publication: USA
CODEN: PSISDG ISSN: 0277-786X
SICI: 0277-786X(2000)3989L.244:AEMR;1-U
Material Identity Number: C574-2000-167
U.S. Copyright Clearance Center Code: 0277-786X/2000/$15.00
Conference Title: Smart Structures and Materials 2000: Damping and

Isolation
Conference Sponsor: SEM; American Soc. Mech. Eng.; BFGoodrich; DARPA; US Army Res. Office
Conference Date: 6-8 March 2000 Conference Location: Newport Beach, CA, USA
Language: English
Subfile: A C

Title: Analysis of electro- and magneto - rheological **flow mode** dampers **using Herschel-Bulkley model**
Abstract: Electrorheological (ER) and **magneto - rheological** (MR) fluid-based **dampers** are typically analyzed using Bingham-plastic shear flow analysis under quasi-steady fully developed flow...

... by measurements reported in the literature, is to allow for post-yield shear thinning and **shear** thickening. To **model** these, the constant post-yield plastic viscosity in Bingham model can be replaced with a power law **model** dependent on **shear** strain rate that is known as the Herschel-Bulkley fluid model. Depending on the value...

... of post-yield shear thickening or thinning behavior can be analyzed. A nominal ER bypass **damper** is considered. **Damping** forces in the **damper** are analyzed by approximate parallel plate geometry. The impacts of flow behavior index on shear...

...strain relationship and velocity profile for variable electric field are also examined numerically. Then, analytical **damping** predictions of ER/MR flow mode **dampers** are compared using the nonlinear Bingham-plastic and nonlinear Herschel-Bulkley analyses.
Descriptors: **damping** ;
Identifiers: magnetorheological flow mode **dampers** ; ...

...electrorheological flow mode **dampers** ; ...

...ER bypass **damper** ; ...

... **damping** forces

*****

9/3,K/4 (Item 2 from file: 2)
DIALOG(R)File 2:INSPEC

07534328 INSPEC Abstract Number: A2000-08-4660H-009, B2000-04-0585-006, C2000-04-3260N-016
Title: Properties and applications of commercial magnetorheological fluids
Author(s): Jolly, M.R.; Bender, J.W.; Carlson, J.D.
Author Affiliation: Thomas Lord Res. Center, Lord Corp., Cary, NC, USA
Journal: Journal of Intelligent Material Systems and Structures vol.10, no.1 p.5-13
Publisher: Technomic Publishing,
Publication Date: Jan. 1999 Country of Publication: USA
CODEN: JMSSER ISSN: 1045-389X
SICI: 1045-389X(199901)10:1L.5:PACM;1-X
Material Identity Number: O559-2000-003

U.S. Copyright Clearance Center Code: 1045-389X/99/010005-09$10.00/0
Language: English
Subfile: A B C
Copyright 2000, IEE

Abstract: The **rheological** and **magnetic** properties of several commercial magnetorheological (MR) fluids are presented and discussed. These fluids are compared...
Descriptors: **brakes** ; ...

... **damping** ;
...Identifiers: **shear mode** devices...

... **brakes** ; ...

... **dampers** ;

*****

9/3,K/5 (Item 3 from file: 2)
DIALOG(R)File 2:INSPEC
(c) 2007 Institution of Electrical Engineers. All rts. reserv.

06447193 INSPEC Abstract Number: B9701-8380-003, C9701-3260N-015
Title: Commercial magneto - rheological **fluid devices**
Author(s): Carlson, J.D.; Catanzarite, D.M.; St. Clair, K.A.
Author Affiliation: Lord Corp., Cary, NC, USA
Journal: International Journal of Modern Physics B Conference Title: Int. J. Mod. Phys. B (Singapore) vol.10, no.23-24 p.2857-65
Publisher: World Scientific,
Publication Date: 30 Oct. 1996 Country of Publication: Singapore
CODEN: IJPBEV ISSN: 0217-9792
SICI: 0217-9792(19961030)10:23/24L.2857:CMRF;1-P
Material Identity Number: K812-96022
Conference Title: 5th International Conference on Electro-Rheological Fluids, Magneto-Rheological Suspensions and Associated Technology
Conference Date: July 1995 Conference Location: Sheffield, UK
Language: English
Subfile: B C
Copyright 1996, IEE

Title: Commercial magneto - rheological **fluid devices**
Descriptors: **brakes** ; ...
... **damping** ;
...Identifiers: direct **shear mode** ; ...

...linear **damper** ; ...

...rotary **brake** ;

*****

9/3,K/6 (Item 1 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)
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08269064 E.I. No: EIP99034606841
Title: Application of magnetorheological dampers **to seismically excited**

structures
Author: Dyke, Shirley J.; Yi, Fu; Frech, Stephen; Carlson, J. David
Corporate Source: Washington Univ, St. Louis, MO, USA
Conference Title: Proceedings of the 1999 17th International Modal Analysis Conference, IMAC. Part 1 (of 2)
Conference Location: Kissimmee, FL, USA Conference Date: 19990208-19990211
E.I. Conference No.: 50015
Source: Proceedings of the International Modal Analysis Conference - IMAC v 1 1999. SEM, Bethel, CT, USA. p 410-416
Publication Year: 1999
CODEN: PMCNEW ISSN: 1046-6770
Language: English

Title: Application of magnetorheological dampers **to seismically excited structures**
...Abstract: in a structure, extending the results of prior experiments with MR devices. Four parallel-plate, **shear - mode** MR **dampers** are used to control a six-story structure. MR devices are selected because they have
...
Descriptors: ***Magnetic** devices; **Rheology** ; Seismic prospecting; Structural analysis; **Damping** ; Earthquake resistance; Vibration control
Identifiers: Magnetorheological (MR) **dampers** ; Seismic control
?

10/3,K/1 (Item 1 from file: 23)
DIALOG(R)File 23:CSA Technology Research Database

0006642607 IP ACCESSION NO: AN140592
User-adaptive control of a magnetorheological prosthetic knee.

Herr, H. ; **Wilkenfeld, A.**

Industrial Robot, v 30, n 1, p p.42-55, 2003
PUBLICATION DATE: 2003

PUBLISHER: Emerald, 60/62 Toller Lane, Bradford, West Yorkshire, BD8 9BY
COUNTRY OF PUBLICATION: UK
PUBLISHER URL: http://www.emeraldinsights.com

RECORD TYPE: Abstract
LANGUAGE: English
ISSN: 0143-991X
FILE SEGMENT: ANTE: Abstracts in New Technologies and Engineering

Herr, H. ; **Wilkenfeld, A.**

DESCRIPTORS: Amputees; Walking; Knees; Artificial joints; Gait; Damping; Fluids; **Magnetic** ; **Rheology** ; Control systems; Amputees; Walking; Knees ; Artificial joints; Gait; Damping; Fluids; **Magnetic** ; **Rheology** ; Control systems
?

File 155:MEDLINE(R) 1950-2006/Dec 16
(c) format only 2006 Dialog
File 73:EMBASE 1974-2007/Jan 17
(c) 2007 Elsevier B.V.
File 5:Biosis Previews(R) 1969-2007/Jan W2
(c) 2007 The Thomson Corporation
File 94:JICST-EPlus 1985-2007/Jan W2
(c)2007 Japan Science and Tech Corp(JST)
File 144:Pascal 1973-2007/Jan W1
(c) 2007 INIST/CNRS
File 34:SciSearch(R) Cited Ref Sci 1990-2007/Jan W2
(c) 2007 The Thomson Corp
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
(c) 2006 The Thomson Corp
File 35:Dissertation Abs Online 1861-2006/Nov
(c) 2006 ProQuest Info&Learning
File 65:Inside Conferences 1993-2007/Jan 19
(c) 2007 BLDSC all rts. reserv.
File 45:EMCare 2007/Jan W2
(c) 2007 Elsevier B.V.
File 23:CSA Technology Research Database 1963-2006/Dec
(c) 2006 CSA.
File 431:MediConf: Medical Con. & Events 1998-2004/Oct B2
(c) 2004 Dr. R. Steck
File 2:INSPEC 1898-2007/Dec W4
(c) 2007 Institution of Electrical Engineers
File 6:NTIS 1964-2007/Jan W2
(c) 2007 NTIS, Intl Cpyrght All Rights Res
File 8:Ei Compendex(R) 1884-2007/Jan W1
(c) 2007 Elsevier Eng. Info. Inc.
File 188:Health Devices Sourcebook 2004
ECRI (A nonprofit agency)
File 198:Health Devices Alerts(R) 1977-2006/Oct W2
(c) 2006 ECRI-nonprft agncy

Set	Items	Description
S1	59311	(PROSTHESIS?? OR PROSTHESES?? OR IMPLANT??? OR PROSTHETIC?-?)(5N)(LEG?? OR ARM?? OR KNEE?? OR BODY()PART?? OR HAND?? OR -LIMB?? OR FOOT?? OR FEET??)
S2	3226	(MAGNETO???? OR MAGNETIC???)(3N)(RHEOLO?????? OR RHEO()LOG-IC????)
S3	44857	SHEAR????(2N)MODE??
S4	450635	BRAKE?? OR DAMP????
S5	2680	AU=(HERR H? OR HERR, H? OR WILKENFELD A? OR WILKENFELD, A? OR BLECK O? OR BLECK, O?)
S6	5656	MAGNETORHEOLOGIC??
S7	2	MAGNETICRHEOLOGIC??
S8	5658	S6 OR S7
S9	131	S8 AND S3 AND S4
S10	1	S9 AND S1
S11	1	S8 AND S3 AND PROSTHE????
S12	0	S11 NOT S10
S13	0	RD (unique items)
S14	85	RD S9 (unique items)
S15	20	S14 NOT PY>2000

S16 13 S8 AND S5
S17 1 S16 AND S3

15/3,K/1 (Item 1 from file: 144)
DIALOG(R)File 144:Pascal

14869149 PASCAL No.: 01-0015847
Analysis of electro- and magneto-rhelogical flow mode dampers **using Herschel-Bulkley model**
Damping **and isolation : Newport Beach, 6-8 March 2000**
LEE Dug-Young; WERELEY Norman M
HYDE TTupper, ed
School of Automotive Eng., Taegu University, Kyungsan, Kyungbuk, Korea, Republic of; Dept. of Aerospace Eng., University of Maryland, College Park, MD 20742, United States
Damping and isolation. Conference (Newport Beach USA) 2000-03-06
Journal: SPIE proceedings series, 2000, 3989 244-255
Language: English

Analysis of electro- and magneto-rhelogical flow mode dampers **using Herschel-Bulkley model**
Damping **and isolation : Newport Beach, 6-8 March 2000**
Electrorheological (ER) and **magnetorheological** (MR) fluid-based **dampers** are typically analyzed using Bingham-plastic shear flow analysis under quasi-steady fully developed flow...
... by measurements reported in the literature, is to allow for post-yield shear thinning and **shear** thickening. To **model** these, the constant post-yield plastic viscosity in Bingham model can be replaced with a power law **model** dependent on **shear** strain rate that is known as the Herschel-Bulkley fluid model. Depending on the value...

... of post-yield shear thickening or thinning behavior can be analyzed. A nominal ER bypass **damper** is considered. **Damping** forces in the **damper** are analyzed by approximate parallel plate geometry. The impacts of flow behavior index on shear...

...strain relationship and velocity profile for variable electric field are also examined numerically. Then, analytical **damping** predictions of ER/MR flow mode **dampers** are compared using the nonlinear Bingham-plastic and nonlinear Herschel-Bulkley analyses.

English Descriptors: Electrorheological fluid; **Magnetorheological** fluid; Measuring methods; Inelasticity; Bingham plastic; Hydraulic **damper**; Parallel plate; Mechanical shock; Shear flow; Pseudoplastic fluid; Rheology; Perspective; Viscosity; Power law; Modelling; Fluid...

15/3,K/2 (Item 2 from file: 144)
DIALOG(R)File 144:Pascal

14561515 PASCAL No.: 00-0227851
Seismic response control of frame structures using magnetorheological **/electrorheological** dampers
XU Y L; QU W L; KO J M
Department of Civil and Structural Engineering, The Hong Kong Polytechnic

University, Hung Hom, Kowloon, Hong Kong; Institute of Civil Engineering and Architecture, Wuhan University of Technology, Wuhan, China
Journal: Earthquake engineering & structural dynamics, 2000, 29 (5) 557-575
Language: English

Seismic response control of frame structures using magnetorheological **/electrorheological** dampers
... optimal displacement control strategies for semi-active control of seismic response of frame structures using **magnetorheological** (MR) **dampers** or electrorheological (ER) **dampers** are proposed in this study. The efficacy of these displacement control strategies is compared with the optimal force control strategy. The stiffness of brace system supporting the smart **damper** is also taken into consideration. An extensive parameter study is carried out to find the...

... may be achieved, and to assess the effects of earthquake intensity and brace stiffness on **damper** performance. The work on example buildings showed that the installation of the smart **dampers** with proper parameters and proper control strategy could significantly reduce seismic responses of structures, and the performance of the smart **damper** is better than that of the common brace or the passive devices. The optimal parameters of the **damper** and the proper control strategy could be identified through a parameter study.

English Descriptors: earthquakes; earthquake engineering; vibration; strategy; controls; buildings; seismic risk; displacements; rigidity; seismic intensity; **models** ; **shear stress**

*****

15/3,K/3 (Item 3 from file: 144)
DIALOG(R)File 144:Pascal

14133001 PASCAL No.: 99-0329187
Application of magnetorheological dampers **to seismically excited structures**
IMAC XVII : 17th international modal analysis conference : Kissimmee FL, 8-11 February 1999
DYKE S J; FU YI; FRECH S; CARLSON J D
Department of Civil Engineering, Washington University, St. Louis, Missouri 63130, United States; Mechanical Products Division, Lord Corporation, Cary, North Carolina 27511, United States
International Society for Optical Engineering, Bellingham WA, United States.
International modal analysis conference, 17 (Kissimmee FL USA) 1999-02-08
Journal: SPIE proceedings series, 1999, 3727 (p.1) 410-416
Language: English

Application of magnetorheological dampers **to seismically excited structures**

This paper presents the results of a recent experiment conducted to demonstrate the potential of **magnetorheological** (MR) devices for seismic control of civil engineering structures. The study discussed herein focuses on...

... in a structure, extending the results of prior experiments with MR devices. Four parallel-plate, **shear - mode** MR **dampers** are used to control a six-story structure. MR devices are selected because they have...

English Descriptors: Structure soil interaction; Seismic load; Vibration **damper** ; **Magnetorheological** fluid; Experimental study; Experimental device; System identification; Optimal design; Algorithm; International conference

*****

15/3,K/4 (Item 4 from file: 144)
DIALOG(R)File 144:Pascal

13301932 PASCAL No.: 98-0025737
Design rules for MR fluid actuators in different working modes
Passive damping **and isolation : San Diego CA, 3-4 march 1997**
BOELTER R; JANOCHA H
DAVIS L Porter, ed
University of Saarland, Laboratory for Process Automation (LPA) PO Box 15 11 50, 66041 Saarbruecken, Germany
International Society for Optical Engineering, Bellingham WA, United States.
Passive damping and isolation. Conference (San Diego CA USA) 1997-03-03
Journal: SPIE proceedings series, 1997, 3045 148-159
Language: English

Passive damping **and isolation : San Diego CA, 3-4 march 1997**
The behaviour of actuators based on **magnetorheological** fluids is determined by a variety of parameters. The **magnetorheological** properties of the MR suspension, the working **mode** (**shear mode** , flow **mode** , squeeze mode) and the design of the magnetic circuit consisting of MR fluid, flux guide...
... in the three working modes was investigated by using a rotational viscometer, a flow mode **damper** and a new measuring technique working in the squeeze mode. The measurement results for various...

... densities are reported and the results of the different working modes are compared. High dynamic **damping** forces dependent on the magnetic field can be achieved especially in the squeeze mode . The...

English Descriptors: Vibration control; Clutch; Vibration **damper** ; Rheology; Magnetic field; Theoretical study; Magnetic circuit; Experimental study

*****

15/3,K/5 (Item 1 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

07187644 Genuine Article#: 134EL No. References: 20
Title: Nondimensional analysis of semi-active electrorheological and magnetorheological dampers using approximate parallel plate models
Author(s): Wereley NM; Pang L
Corporate Source: UNIV MARYLAND,DEPT AEROSP ENGN, ALFRED GESSOW ROTORCRAFT CTR/COLLEGE PK//MD/20742
Journal: SMART MATERIALS & STRUCTURES, 1998, V7, N5 (OCT), P732-743
ISSN: 0964-1726 Publication date: 19981000
Publisher: IOP PUBLISHING LTD, DIRAC HOUSE, TEMPLE BACK, BRISTOL BS1 6BE, ENGLAND
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Title: Nondimensional analysis of semi-active electrorheological and magnetorheological dampers using approximate parallel plate models
Abstract: We develop nonlinear quasi-steady electrorheological (ER) and **magnetorheological** (MR) **damper** models using an idealized Bingham plastic shear flow mechanism. **Dampers** with cylindrical geometry are investigated, where **damping** forces are developed in an annular bypass via Couette (**shear mode**), Poiseuille (flow mode) flow, or combined Couette and Poiseiulle flow (mixed mode). Models are based...
...and are compared to our prior 1D axisymmetric models. Three nondimensional groups are introduced for **damper** analysis, namely, the Bingham number, Bi, the nondimensional plug thickness, <(delta)over bar>; and the...

...1, or the nondimensional plug thickness is small, <(delta)over bar> much less than 1. **Damper** performance is characterized in terms of the **damping** coefficient, which is the ratio of the equivalent viscous **damping** constant, C-eq, to the Newtonian viscous **damping** constant, C. In **shear mode** , the **damping** coefficient is a linear function of the Bingham number. In flow mode, the **damping** coefficient is a function of the nondimensional plug thickness only. For the mixed mode **damper** , the **damping** coefficient reduces to that for the flow mode case when the area coefficient is large. The quasi-steady **damping** coefficient versus nondimensional plug thickness diagram is experimentally validated using measured 10 Hz hysteresis cycles for a electrorheological mixed mode **damper** .

15/3,K/6 (Item 1 from file: 23)

0006579651 IP ACCESSION NO: A04-16951
Nondimensional quasi-steady analysis of magnetorheological dampers **utilizing a Herschel-Bulkley model with preyield viscosity**

John, Shaju; Werely, Norman M.
Maryland, Univ., College Park
AUTHOR EMAIL: shaju@glue.umd.edu

Smart Structures and Materials 2003, v 5052, p 53-65, 2003

CONFERENCE:
Damping and Isolation, San Diego, CA, Mar. 3-5, 2003

DOCUMENT TYPE: Conference Volume - Analytic
RECORD TYPE: Abstract
LANGUAGE: English
ISSN: 0277-786X
ISBN: 0-8194-4857-5
REPORT NO: SPIE-5052
FILE SEGMENT: Aerospace & High Technology
Nondimensional quasi-steady analysis of magnetorheological dampers **utilizing a Herschel-Bulkley model with preyield viscosity**

ABSTRACT:
Dampers based on electrorheological (ER) and magnetorheolgical (MR) fluids can be analyzed under assumptions of quasi-steady, fully developed flow behavior. Models that have been used to characterize ER and MR **dampers** include the Bingham-plastic, the Herschel-Bulkley and biviscous models. In the Bingham-plastic and...

...MR valve. Typical results include shear stress and velocity profiles across the valve gap, equivalent **damping** and **damping** coefficients.

DESCRIPTORS: **Magnetorheological** fluids; Vibration **damping** ; Electrorheological fluids; **Dampers** ; **Shear stress** ; Mathematical **models** ; Strain rate; Constitutive equations; Flow distribution

15/3,K/7 (Item 2 from file: 23)

0005944330 IP ACCESSION NO: 483115
Analysis and testing of electrorheological bypass dampers

Lindler, Jason; Wereley, Norman M
Univ of Maryland, College Park, MD, USA

Journal of Intelligent Material Systems and Structures, v 10, n 5, p 363-376, 2000
PUBLICATION DATE: 2000

PUBLISHER: Sage Science Press, 2455 Teller Road, Thousand Oaks, CA, 91320
COUNTRY OF PUBLICATION: USA
PUBLISHER URL: http://www.sagepub.com
PUBLISHER EMAIL: sagescience@sagepub.com

DOCUMENT TYPE: Journal Article
RECORD TYPE: Abstract
LANGUAGE: English
ISSN: 1045-389X
FILE SEGMENT: Solid State & Superconductivity Abstracts
Analysis and testing of electrorheological bypass dampers

ABSTRACT:
We experimentally validate nonlinear quasi-steady electrorheological (ER) and **magnetorheological** (MR) **damper** models, using an idealized Bingham plastic shear flow mechanism, for the flow mode of **damper** operation. An

electrorheological valve or bypass **damper** was designed, and fabricated using predominantly commercial off-the-shelf hydraulic components. Both the hydraulic cylinder and the bypass duct have cylindrical geometry, and **damping** forces are developed in the annular bypass via Poiseuille (flow mode) flow. **Damper** models assume parallel plate geometry. Three nondimensional groups are used for **damper** analysis, namely, the Bingham number, Bi, the nondimensional plug thickness, delta , and the area coefficient...

...sectional area of the annular bypass, A sub(d). In the flow mode case, the **damping** coefficient, which is defined as the ratio of equivalent viscous **damping** of the Bingham plastic material, C sub(eq), to the Newtonian viscous **damping** , C, is a function only of the nondimensional plug thickness. The **damper** was tested using a mechanical **damper** dynamometer for sinusoidal stroke of 2 in., over a range of frequencies below 0.63 Hz. The **damping** coefficient vs. nondimensional plug thickness diagram was experimentally validated using these data over a range of **damper** shaft velocities or frequencies and applied electric fields. Because the behavior of ER and MR fluids are qualitatively similar, these ER **damper** modeling results can be extended to analysis of flow mode MR **dampers** .

DESCRIPTORS: Mathematical **models** ; Plastic flow; **Shear** flow; **Damping** ; Rheology
IDENTIFIERS: Electrorheological fluids; **Magnetorheological** fluids

15/3,K/8 (Item 3 from file: 23)

0005831026 IP ACCESSION NO: A01-10450
Testing and modeling a cone-shaped squeeze-film mode electrorheological damper

Wang, X J; Zhang, P Q; Tang, X; Tao, R
China, Univ. of Science and Technology, Anhui [Wang

Journal of Intelligent Material Systems and Structures, v 10, n 9, p 748-752, Sept. 1999
PUBLICATION DATE: 1999

PUBLISHER: Sage Science Press, 2455 Teller Road, Thousand Oaks, CA, 91320
COUNTRY OF PUBLICATION: USA
PUBLISHER URL: http://www.sagepub.com
PUBLISHER EMAIL: sagescience@sagepub.com

CONFERENCE:
, UNITED STATES

DOCUMENT TYPE: Journal Article
RECORD TYPE: Abstract
LANGUAGE: ENGLISH
ISSN: 1045-389X
FILE SEGMENT: Aerospace & High Technology

Testing and modeling a cone-shaped squeeze-film mode electrorheological damper

ABSTRACT:
Experiments on a cone-shaped squeeze-film mode ER **damper** are reported. An analytical model is developed to calculate the **damping** force as a function of the vibration amplitude, frequency, and yield stress of the ER
...

...agree with the experiments very well at small amplitudes. The cone-shaped electrodes enable the **damper** to benefit from both **shear mode damper** and squeeze-film mode **damper**. The azimuth angle of the cone electrodes plays an important role in magnifying the **damping** coefficient of this new type of ER **damper**. (Author)

DESCRIPTORS: **Electrorheological fluids; Vibration damping ; Squeeze films; Cones; Tests; Mathematical models; Electrodes; Magnetorheological fluids; Pressure gradients**

*****
15/3,K/9 (Item 4 from file: 23)
DIALOG(R)File 23:CSA Technology Research Database

0005804906 IP ACCESSION NO: 1209517
Seismic hazard mitigation using multiple magnetorheological **devices**

Dyke, S. J.; Yi, F.; Carlson, J. D.

PAGES: 361-364
PUBLICATION DATE: 1999

PUBLISHER: American Society of Civil Engineers, Reston, Virginia

CONFERENCE:
Structural Engineering in the 21st Century: Proceedings of the 1999 Structures Congress, April 18-21, 1999, New Orleans, Louisiana

DOCUMENT TYPE: Conference Paper
RECORD TYPE: Abstract
LANGUAGE: English
ISBN: 0-7844-0421-6
NUMBERS: callno 400/S89/1999
FILE SEGMENT: Earthquake Engineering Abstracts
Seismic hazard mitigation using multiple magnetorheological **devices**

ABSTRACT:
... paper discusses the results of a series of experiments conducted to evaluate the performance of **magnetorheological** devices for earthquake hazard mitigation. **Shear - mode** MR **dampers** are used to control the responses of a six story building subjected to ground motion. A multiple-input configuration is used in which two **dampers** are rigidly attached between the base and first floor and between the first and second
...

DESCRIPTORS: **Magnetorheological** fluid **damping** devices; Multistory

frames; Structural control; Algorithms

15/3,K/10 (Item 5 from file: 23)
DIALOG(R)File 23:CSA Technology Research Database

0005535574 IP ACCESSION NO: A99-12174
Modeling of magnetorheological **fluid** damper **with parallel plate behavior**

Falah, Abdulazim H; Clark, William W; Phule, Pradeep P
Pittsburgh, Univ., PA [Falah

PAGES: 276-283
PUBLICATION DATE: 1998

PUBLISHER: Bellingham, WA: Society of Photo-Optical Instrumentation Engineers (SPIE Proceedings. Vol. 3327)

CONFERENCE:
Smart structures and materials 1998: Passive damping and isolation; Proceedings of the Meeting, San Diego, CA, UNITED STATES, 2-3 Mar. 1998

DOCUMENT TYPE: Conference Paper
RECORD TYPE: Abstract
LANGUAGE: ENGLISH
NUMBERS: A99-12151 01-31; SPIE-3327
FILE SEGMENT: Aerospace & High Technology

Modeling of magnetorheological **fluid** damper **with parallel plate behavior**

ABSTRACT:
This paper presents the modeling and experimental testing of a **magnetorheological** (MR) fluid **damper**. The **damper** consists of a main cylinder and piston rod that pushes MR fluid through a very...

...the cylinder. Magnetic coils are wrapped outside the cylinder to create the magnetic field. The **damper** model is developed based on parallel plate analysis by using both Newtonian and Bingham shear...

...is a function of magnetic field. The model is validated through experimental testing of the **damper**. (Author)

DESCRIPTORS: *Vibration isolators; * **Magnetorheological** fluids; **Parallel plates; Mathematical models ; Shear flow; Newtonian fluids; Magnetic fields**

*****

15/3,K/11 (Item 6 from file: 23)
DIALOG(R)File 23:CSA Technology Research Database

0005367682 IP ACCESSION NO: A97-24971
Analysis of electrorheological dampers **via approximate parallel plate**

models

Wereley, Norman M; Pang, Li
Maryland, Univ., College Park [Wereley
PUBLICATION DATE: 1997

CONFERENCE:
AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference and Exhibit, 38th, and AIAA/ASME/AHS Adaptive Structures Forum, Kissimmee, FL, UNITED STATES, 7-10 Apr. 1997

DOCUMENT TYPE: Conference
RECORD TYPE: Abstract
LANGUAGE: ENGLISH
REPORT NO: AIAA Paper 97-1205
NUMBERS: Contract: DAAL03-92-0121; DAAH04-96-10078; NCC2-944
FILE SEGMENT: Aerospace & High Technology

Analysis of electrorheological dampers **via approximate parallel plate models**

ABSTRACT:
We develop nonlinear quasi-steady electrorheological (ER) and **magnetorheological** (MR) **damper** models using idealized Bingham plastic shear flow. **Dampers** with cylindrical geometry are investigated, where **damping** forces are developed in an annular bypass via Couette (**shear mode**), flow Poiseuille (flow mode) flow, or combined Couette and Poiseiulle flow (mixed mode). Models are...

...and are compared to our prior 1D axisymmetric models. Three nondimensional groups are introduced for **damper** analysis, namely, the Bingham number, Bi, the nondimensional plug thickness, and the area coefficient, which...

...much less than 1, or the nondimensional plug thickness is much less than 1. The **damping** coefficient is the ratio of the equivalent viscous **damping** constant to the Newtonian viscous **damping damping** constant. In **shear mode** , the **damping** coefficient is a linear function of the Bingham number. In flow mode, the **damping** coefficient is a function of nondimensional plug thickness only. In mixed mode, the **damping** coefficient reduces to the flow mode case when the area coefficient is large. The quasi-steady **damping** coefficient vs. nondimensional plug thickness diagram is validated. (Author)

DESCRIPTORS: **Dampers ; Electrorheological fluids; Parallel plates; Couette flow; Laminar flow; Elastic damping ; Shear flow; Plastic flow; Approximation**

*****

15/3,K/12 (Item 1 from file: 2)

08160503 INSPEC Abstract Number: C2002-02-3260N-013
Title: Modelling of a magnetorheological damper **by parameter-estimation**

Author(s): Lederer, P.; Salloker, M.G.; Doczy, S.
Author Affiliation: Quillion Ltd., Cambridge, UK
Conference Title: ACTUATOR 2000. 7th International Conference on New Actuators and International Exhibition on Smart Actuators and Drive Systems. Conference Proceedings p.143-6
Editor(s): Borgmann, H.
Publisher: MESSE BREMEN GMBH, Bremen, Germany
Publication Date: 2000 Country of Publication: Germany 688 pp.
ISBN: 3 933339 02 2 Material Identity Number: XX-2000-01240
Conference Title: Proceedings of 7th International Conference on New Actuators - ACTUATOR 2000
Conference Date: 19-21 June 2000 Conference Location: Bremen, Germany
Language: English
Subfile: C

Title: Modelling of a magnetorheological damper **by parameter-estimation**
Abstract: Theoretical modelling of the behaviour of a MR- **damper** can give only the mathematical structure of the model. The parameters of the models depend strongly on the MR-fluid and the **damper** construction. Therefore it is easier to determine the parameters by parameter-estimation. A MR- **damper** which works in the **shear mode** was constructed. In addition a test rig was build, to excite the **damper** with step and sinusoidal forces. The excitation force and the stroke of the **damper** were measured at different electric current and varying temperatures. These measured data are the base for the parameter-identification of different models, a spring- **damper** model, a Bingham-model and a Casson-model. A comparison of the experimental and the simulation results is given. The model with the best fit, the spring **damper** model, was extended to incorporate the dependence of the temperature and the electric current.
Descriptors: **damping** ;
Identifiers: **magnetorheological damper** ; ...

... **shear mode** ; ...

... **damper** stroke...

...spring- **damper** model

15/3,K/13 (Item 2 from file: 2)
DIALOG(R)File 2:INSPEC

07698478 INSPEC Abstract Number: A2000-20-4660H-004, C2000-10-3260N-017
Title: Analysis of electro- and magneto-rheological flow mode dampers **using Herschel-Bulkley model**
Author(s): Dug-Young Lee; Wereley, N.M.
Author Affiliation: Sch. of Autom. Eng., Taegu Univ., South Korea
Journal: Proceedings of the SPIE - The International Society for Optical Engineering Conference Title: Proc. SPIE - Int. Soc. Opt. Eng. (USA) vol.3989 p.244-55
Publisher: SPIE-Int. Soc. Opt. Eng,
Publication Date: 2000 Country of Publication: USA
CODEN: PSISDG ISSN: 0277-786X

SICI: 0277-786X(2000)3989L.244:AEMR;1-U
Material Identity Number: C574-2000-167
U.S. Copyright Clearance Center Code: 0277-786X/2000/$15.00
Conference Title: Smart Structures and Materials 2000: Damping and Isolation
Conference Sponsor: SEM; American Soc. Mech. Eng.; BFGoodrich; DARPA; US Army Res. Office
Conference Date: 6-8 March 2000 Conference Location: Newport Beach, CA, USA
Language: English
Subfile: A C

Title: Analysis of electro- and magneto-rheological flow mode dampers **using Herschel-Bulkley model**
Abstract: Electrorheological (ER) and magneto-rheological (MR) fluid-based **dampers** are typically analyzed using Bingham-plastic shear flow analysis under quasi-steady fully developed flow...

... by measurements reported in the literature, is to allow for post-yield shear thinning and **shear** thickening. To **model** these, the constant post-yield plastic viscosity in Bingham model can be replaced with a power law **model** dependent on **shear** strain rate that is known as the Herschel-Bulkley fluid model. Depending on the value...

... of post-yield shear thickening or thinning behavior can be analyzed. A nominal ER bypass **damper** is considered. **Damping** forces in the **damper** are analyzed by approximate parallel plate geometry. The impacts of flow behavior index on shear...

...strain relationship and velocity profile for variable electric field are also examined numerically. Then, analytical **damping** predictions of ER/MR flow mode **dampers** are compared using the nonlinear Bingham-plastic and nonlinear Herschel-Bulkley analyses.
Descriptors: **damping** ;
Identifiers: **magnetorheological** flow mode **dampers** ; ...

...electrorheological flow mode **dampers** ; ...

...ER bypass **damper** ; ...

... **damping** forces

*****

15/3,K/14 (Item 3 from file: 2)
DIALOG(R)File 2:INSPEC

07534328 INSPEC Abstract Number: A2000-08-4660H-009, B2000-04-0585-006, C2000-04-3260N-016
Title: Properties and applications of commercial magnetorheological **fluids**
Author(s): Jolly, M.R.; Bender, J.W.; Carlson, J.D.
Author Affiliation: Thomas Lord Res. Center, Lord Corp., Cary, NC, USA
Journal: Journal of Intelligent Material Systems and Structures vol.10, no.1 p.5-13

Publisher: Technomic Publishing,
Publication Date: Jan. 1999 Country of Publication: USA
CODEN: JMSSER ISSN: 1045-389X
SICI: 1045-389X(199901)10:1L.5:PACM;1-X
Material Identity Number: O559-2000-003
U.S. Copyright Clearance Center Code: 1045-389X/99/010005-09$10.00/0
Language: English
Subfile: A B C
Copyright 2000, IEE

Title: Properties and applications of commercial magnetorheological **fluids**
Abstract: The rheological and magnetic properties of several commercial **magnetorheological** (MR) fluids are presented and discussed. These fluids are compared using appropriate figures of merit...
Descriptors: **brakes** ; ...

... **damping** ;
Identifiers: commercial **magnetorheological** fluids...

... **shear mode** devices...

... **brakes** ; ...

... **dampers** ;

*****
15/3,K/15 (Item 4 from file: 2)
DIALOG(R)File 2:INSPEC

07443486 INSPEC Abstract Number: B2000-02-8380-001, C2000-02-3260N-001
Title: Design issues in magnetorheological **fluid actuators**
Author(s): Muriuki, M.; Clark, W.W.
Author Affiliation: Vibration & Control Lab., Pittsburgh Univ., PA, USA
Journal: Proceedings of the SPIE - The International Society for Optical Engineering Conference Title: Proc. SPIE - Int. Soc. Opt. Eng. (USA) vol.3672 p.55-64
Publisher: SPIE-Int. Soc. Opt. Eng,
Publication Date: 1999 Country of Publication: USA
CODEN: PSISDG ISSN: 0277-786X
SICI: 0277-786X(1999)3672L.55:DIMF;1-X
Material Identity Number: C574-1999-209
U.S. Copyright Clearance Center Code: 0277-786X/99/$10.00
Conference Title: Smart Structures and Materials 1999: Passive Damping and Isolation
Conference Sponsor: SPIE; Soc. Exp. Mech.; ASME; BFGoodrich Aerosp.; Defence Adv. Res. Projects Agency; Army Res. Office
Conference Date: 1-2 March 1999 Conference Location: Newport Beach, CA, USA
Language: English
Subfile: B C
Copyright 1999, IEE

Title: Design issues in magnetorheological **fluid actuators**
Descriptors: **damping** ;

Identifiers: **magnetorheological** fluid actuators...

... **shear mode** ; ...

... **dampers** ;

*****

15/3,K/16 (Item 5 from file: 2)
DIALOG(R)File 2:INSPEC

07364797 INSPEC Abstract Number: C1999-11-3330-008
Title: Seismic response control using smart dampers
Author(s): Fu Yi; Dyke, S.J.; Caicedo, J.M.; Carlson, J.D.
Author Affiliation: Dept. of Civil Eng., Washington Univ., St. Louis, MO, USA
Conference Title: Proceedings of the 1999 American Control Conference (Cat. No. 99CH36251) Part vol.2 p.1022-6 vol.2
Publisher: IEEE, Piscataway, NJ, USA
Publication Date: 1999 Country of Publication: USA 6 vol. (lxxxviii+4571) pp.
ISBN: 0 7803 4990 3 Material Identity Number: XX-1999-02123
U.S. Copyright Clearance Center Code: 0 7803 4990 3/99/$10.00
Conference Title: Proceedings of the 1999 American Control Conference
Conference Sponsor: American Automatic Control Council; IFAC
Conference Date: 2-4 June 1999 Conference Location: San Diego, CA, USA
Language: English
Subfile: C

Title: Seismic response control using smart dampers
Abstract: Presents the results of a numerical study conducted to demonstrate the capabilities of multiple **magnetorheological** (MR) devices for seismic control of civil engineering structures when used in conjunction with a...

... experimental setup in the Washington University Structural Control and Earthquake Engineering Lab. Four parallel-plate, **shear - mode** MR **dampers** are used to control a six-story structure. The control devices are arbitrarily located in...
...Identifiers: smart **dampers** ; ...

... **magnetorheological** devices...

...parallel-plate **shear - mode dampers** ;

*****

15/3,K/17 (Item 6 from file: 2)
DIALOG(R)File 2:INSPEC

07259015 INSPEC Abstract Number: B1999-07-8380-013, C1999-07-3260N-015
Title: ER/MR long stroke damper **: performance testing, modelling and control strategy simulation**
Author(s): Peel, D.J.; Bullough, W.A.; Stanway, R.
Author Affiliation: Dept. of Mech. Eng., Sheffield Univ., UK

Conference Title: Proceedings of the 6th International Conference on Electro-Rheological Fluids, Magneto-Rheological Suspensions and their Applications p.744-51
Editor(s): Nakano, M.; Koyama, K.
Publisher: World Scientific, Singapore
Publication Date: 1998 Country of Publication: Singapore xii+893 pp.
ISBN: 981 02 3750 2 Material Identity Number: XX-1998-03251
Conference Title: Proceedings of the 6th International Conference on Electro-Rheological Fluids, Magneto-Rheological Suspensions and their Applications
Conference Date: 22-25 July 1997 Conference Location: Yonezawa, Japan
Language: English
Subfile: B C

Title: ER/MR long stroke damper **: performance testing, modelling and control strategy simulation**
...Abstract: is given of procedures developed towards exploitation of the electrostructured fluid-long stroke, piston cylinder **damper** /shock absorber and its optimisation in various applications.
Descriptors: **damping** ;
...Identifiers: long stroke **damper** ; ...

...electrorheological **damper** ; ...

... **magnetorheological damper** ; ...

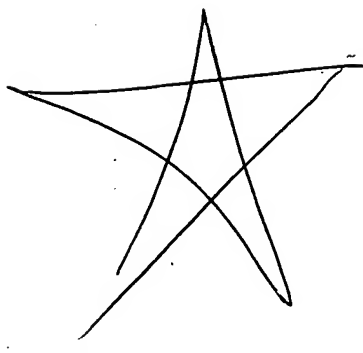
... **shear mode** ; ...

... **damping** strategy

15/3,K/18 (Item 7 from file: 2)
DIALOG(R)File 2:INSPEC

06625854 INSPEC Abstract Number: C9708-3260J-001
Title: Actuators based on electrorheological and magnetorheological **fluids**
Author(s): Bolter, R.; Janocha, H.
Author Affiliation: Saarlandes Univ., Saarbrucken, Germany
Journal: Automatisierungstechnische Praxis vol.39, no.5 p.18-20, 22-6
Publisher: Oldenbourg,
Publication Date: May 1997 Country of Publication: Germany
CODEN: ARTPER ISSN: 0178-2320
SICI: 0178-2320(199705)39:5L.18:ABEM;1-N
Material Identity Number: I702-97005
Language: German
Subfile: C

Title: Actuators based on electrorheological and magnetorheological **fluids**
Abstract: Electrorheological (ER) and **magnetorheological** (MR) fluids change their flow resistance under the influence of an external control



field. This...
... control field. Three working modes exist in energy transducers using ER or MR fluid: the **shear mode** , the flow mode and the squeeze mode. These modes can occur alone or in combination...

... applications are possible with ER/MR fluid actuators, such as clutches, (hydraulic) valves and vibration **dampers** . Known elements with improved properties and entirely new applications can be realized with the help...
...Identifiers: **magnetorheological** fluids...

...vibration **damping** ;

*****

15/3,K/19 (Item 8 from file: 2)
DIALOG(R)File 2:INSPEC

06447193 INSPEC Abstract Number: B9701-8380-003, C9701-3260N-015
Title: Commercial magneto-rheological fluid devices
Author(s): Carlson, J.D.; Catanzarite, D.M.; St. Clair, K.A.
Author Affiliation: Lord Corp., Cary, NC, USA
Journal: International Journal of Modern Physics B Conference Title: Int. J. Mod. Phys. B (Singapore) vol.10, no.23-24 p.2857-65
Publisher: World Scientific,
Publication Date: 30 Oct. 1996 Country of Publication: Singapore
CODEN: IJPBEV ISSN: 0217-9792
SICI: 0217-9792(19961030)10:23/24L.2857:CMRF;1-P
Material Identity Number: K812-96022
Conference Title: 5th International Conference on Electro-Rheological Fluids, Magneto-Rheological Suspensions and Associated Technology
Conference Date: July 1995 Conference Location: Sheffield, UK
Language: English
Subfile: B C

Abstract: Controllable **magnetorheological** (MR) fluid devices have reached the stage where they are in commercial production. Such devices...
Descriptors: **brakes** ; ...

... **damping** ;
Identifiers: **magnetorheological** fluid devices...

...direct **shear mode** ; ...

...linear **damper** ; ...

...rotary **brake** ;

*****

15/3,K/20 (Item 1 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

08765461 E.I. No: EIP01015482419
Title: Seismic response control using smart dampers
Author: Yi, Fu; Dyke, Shirley J.; Caicedo, Juan M.; Carlson, J. David

Corporate Source: Washington Univ, St. Louis, MO, USA
Conference Title: Proceedings of the 1999 American Control Conference (99ACC)
Conference Location: San Diego, CA, USA Conference Date: 20990602-20990604
E.I. Conference No.: 55827
Source: Proceedings of the American Control Conference v 2 1999. IEEE, Piscataway, NJ, USA,99CB36251. p 1022-1026
Publication Year: 1999
CODEN: PRACEO ISSN: 0743-1619
Language: English

Title: Seismic response control using smart dampers
...Abstract: paper presents the results of a numerical study conducted to demonstrate the capabilities of multiple **magnetorheological** (MR) devices for seismic control of civil engineering structures when used in conjunction with a...
...Control and Earthquake Engineering Lab (http://www.seas.wustl.edu/research/quake/). Four parallel-plate, **shear - mode** MR **dampers** are used to control a six-story structure. The control devices are arbitrarily located in...
Descriptors: *Vibration control; **Damping** ; Earthquake resistance; Structural analysis; Algorithms; Optimal control systems; Control system analysis; Computer simulation; Civil engineering...
Identifiers: **Magnetorheological dampers** ; Seismic response control
?

17/3,K/1 (Item 1 from file: 5)
DIALOG(R)File 5:Biosis Previews(R)

0014966582 BIOSIS NO.: 200400337371
Electronically controlled prosthetic knee
AUTHOR: Deffenbaugh Bruce W (Reprint); **Herr Hugh M** ; Pratt Gill A; Wittig Michael B
AUTHOR ADDRESS: Honolulu, HI, USA**USA
JOURNAL: Official Gazette of the United States Patent and Trademark Office Patents 1284 (3): July 20, 2004 2004
MEDIUM: e-file
PATENT NUMBER: US 6764520 PATENT DATE GRANTED: July 20, 2004 20040720
PATENT CLASSIFICATION: 623-24 PATENT ASSIGNEE: Massachusetts Institute of Technology PATENT COUNTRY: USA
ISSN: 0098-1133 _(ISSN print)
DOCUMENT TYPE: Patent
RECORD TYPE: Abstract
LANGUAGE: English

...AUTHOR: **Herr Hugh M**

...ABSTRACT: prosthetic knee which utilizes a plurality of interspersed and alternating rotors and stators to shear **magnetorheological** fluid in gaps formed therebetween. Advantageously, by operating in the " **shear mode** " there is substantially no or negligible fluid pressure buildup or change. Moreover, the multiple MR...

File 350:Derwent WPIX 1963-2006/UD=200705
(c) 2007 The Thomson Corporation
File 347:JAPIO Dec 1976-2006/Sep(Updated 061230)
(c) 2007 JPO & JAPIO

Set	Items	Description
S1	4753	(PROSTHESIS?? OR PROSTHESES?? OR IMPLANT??? OR PROSTHETIC?-?)(5N)(LEG?? OR ARM?? OR KNEE?? OR BODY()PART?? OR HAND?? OR -LIMB?? OR FOOT?? OR FEET??)
S2	591	(MAGNETO???? OR MAGNETIC???)(3N)(RHEOLO?????? OR RHEO()LOG-IC????)
S3	671	SHEAR????(2N)MODE??
S4	405854	BRAKE?? OR DAMP????
S5	37	AU=(HERR H? OR HERR, H? OR WILKENFELD A? OR WILKENFELD, A? OR BLECK O? OR BLECK, O?)
S6	0	S1 AND S2 AND S3 AND S4
S7	1	S2 AND S3 AND S4
S8	2	S2 AND S3
S9	1	S8 NOT S7
S10	5	S5 AND S1
S11	5	S10 NOT S8
S12	0	S11 AND S2
S13	0	S5 AND S2

7/3,K/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0013810945 - Drawing available
WPI ACC NO: 2003-279200/200327
XRPX Acc No: N2003-221719
Magneto - rheological damper **has working space for rheological fluid defined by annular space between piston and cylinder extending at angle to piston axis**
Patent Assignee: BOSCH REXROTH AG (BOSC); MANECKE P (MANE-I); MANHARTSGRUBER B (MANH-I); WINKLER B (WINK-I)
Inventor: MANECKE P; MANHARTSGRUBER B; WINKLER B
Patent Family (10 patents, 99 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update
WO 2003025418	A1	20030327	WO 2002DE3062	A	20020821	200327 B
DE 10143980	A1	20030327	DE 10143980	A	20010907	200331 E
EP 1436523	A1	20040714	EP 2002769878	A	20020821	200446 E
			WO 2002DE3062	A	20020821	
AU 2002336039	A1	20030401	AU 2002336039	A	20020821	200452 E
US 20040262106	A1	20041230	WO 2002DE3062	A	20020821	200503 E
			US 2004488988	A	20040813	
JP 2005502850	W	20050127	WO 2002DE3062	A	20020821	200510 E
			JP 2003529016	A	20020821	
CN 1553998	A	20041208	CN 2002817550	A	20020821	200517 E
EP 1436523	B1	20051130	EP 2002769878	A	20020821	200579 E
			WO 2002DE3062	A	20020821	
DE 50205139	G	20060105	DE 50205139	A	20020821	200612 E
			EP 2002769878	A	20020821	
			WO 2002DE3062	A	20020821	
US 7070027	B2	20060704	WO 2002DE3062	A	20020821	200644 E
			US 2004488988	A	20040813	

Priority Applications (no., kind, date): DE 10143980 A 20010907

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
WO 2003025418	A1	DE	25	2	

National Designated States,Original: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW
Regional Designated States,Original: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW

EP 1436523	A1	DE	PCT Application WO 2002DE3062 Based on OPI patent WO 2003025418

Regional Designated States,Original: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR

AU 2002336039	A1	EN	Based on OPI patent WO 2003025418
US 20040262106	A1	EN	PCT Application WO 2002DE3062
JP 2005502850	W	JA 33	PCT Application WO 2002DE3062 Based on OPI patent WO 2003025418
EP 1436523	B1	DE	PCT Application WO 2002DE3062

Based on OPI patent WO 2003025418
Regional Designated States,Original: AT DE FR GB IT
DE 50205139 G DE Application EP 2002769878
PCT Application WO 2002DE3062
Based on OPI patent EP 1436523
Based on OPI patent WO 2003025418
US 7070027 B2 EN PCT Application WO 2002DE3062
Based on OPI patent WO 2003025418

Magneto - rheological damper **has working space for rheological fluid defined by annular space between piston and cylinder extending...**

Original Titles:
MAGNETO - RHEOLOGICAL DAMPER
...

...Magneto-Rheologischer **Dampfer**
...

...MAGNETO-RHEOLOGISCHER **DAMPFER**
...

...MAGNETO-RHEOLOGISCHER **DAMPFER**
...

... **MAGNETO - RHEOLOGICAL DAMPER**
...

...MAGNETO-RHEOLOGISCHER **DAMPFER**
...

... **MAGNETO - RHEOLOGICAL DAMPER**
...
...AMORTISSEUR **MAGNETO - RHEOLOGIQUE**
...

... **Magneto - rheological damper**
...

... **Magneto - rheological damper**
...

...MAGNETO-RHEOLOGISCHER **DAMPFER**
...

... **MAGNETO - RHEOLOGICAL DAMPER**
...

...AMORTISSEUR **MAGNETO - RHEOLOGIQUE**

Alerting Abstract ...NOVELTY - The **damper** has a piston (4) displaced within a cylinder (8) filled with a **magneto - rheological** fluid with **rheological** characteristics altered by application of a magnetic field, displaced from a working space into a...
USE - The **magneto - rheological damper** is used for **damping** high frequencies, e.g. for a railway track...

...ADVANTAGE - **Magneto - rheological damper** can operate in valve and **shear modes** .

...

...DESCRIPTION OF DRAWINGS - The figure shows a cross-section through a **magneto - rheological damper** .

Title Terms.../Index Terms/Additional Words: **DAMP** ;

Original Publication Data by Authority

Original Abstracts:
Offenbart ist ein magneto-rheologischer (MR) **Dampfer** mit einem Kolben, der in einem mit einer magneto-rheologischen Flussigkeit gefullten Zylinders gefuhrt ist...

...A **magneto - rheological** (MR) **damper** (2) is disclosed, comprising a piston running in a cylinder filled with a **magneto - rheological** fluid, whereby the working volume of which is embodied at an angle to the piston ...

...What is disclosed is a **magneto - rheological** (MR) **damper** including a piston guided in a cylinder that is filled with a **magneto - rheological** fluid, its work volume being formed oblique relative to the piston axis between the piston...

...A **magneto - rheological** (MR) **damper** including a piston guided in a cylinder that is filled with a **magneto - rheological** fluid, its work volume being formed oblique relative to the piston axis between the piston ...

...Offenbart ist ein magneto-rheologischer (MR) **Dampfer** (2) mit einem Kolben (4), der in einem mit einer magneto-rheologischen Flussigkeit gefullten Zylinders...

...A **magneto - rheological** (MR) **damper** (2) is disclosed, comprising a piston running in a cylinder filled with a **magneto - rheological** fluid, whereby the working volume of which is embodied at an angle to the piston ...
...L'invention concerne un amortisseur (2) **magneto - rheologique** (MR) comprenant un piston (4) mobile dans un cylindre rempli de fluide **magneto - rheologique** . L'invention est caracterisee en ce que l'espace de travail est situe a l...
Claims:
1. Magneto-Rheologischer (MR) **Dampfer** (2) mit einem Kolben (4), der in einem mit einer magneto-rheologischen Flussigkeit gefullten Dampferinnenraum...

...Magneto-Rheologischer (MR) **Dampfer** (2) mit einem Kolben (4), der in einem mit einer magneto-rheologischen Flussigkeit gefullten Dampferinnenraum...

... **Magneto - rheological** (MR) **damper** (2) including a piston (4) guided

in a **damper** cavity (6) of a cylinder (8) that is filled with a **magneto - rheological** fluid, the **rheological** properties of which may be modified by application of a magnetic field, wherein concurrently with...

...Amortisseur **magneto - rheologique** (MR) (2) avec un piston (4) qui est guide dans un espace interieur d'amortisseur (6) rempli d'un liquide **magneto - rheologique** d'un cylindre (8), dont les proprietes rheologiques peuvent etre modifiees par l'application d...

...1. A **magneto - rheological** (MR) **damper** including a piston guided in a **damper** cavity of a cylinder that is filled with a **magneto - rheological** fluid, the **rheological** properties of which may be modified by application of a magnetic field; andwherein concurrently...

...The invention claimed is:1. **A magneto** -rheological (**MR**) damper including a piston guided in **a** damper cavity of a cylinder that is filled with **a magneto** -rheological fluid, **the** rheological properties of which may be modified by application of a magnetic field; and wherein
?

9/3,K/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0014901767 - Drawing available
WPI ACC NO: 2005-249540/
Mechanism using combined action modes of rheological fluid to improve output of mechanism through simultaneous use of various action modes of rheological fluid
Patent Assignee: KOREA ADV INST SCI & TECHNOLOGY (KOAD)
Inventor: CHO C H; HWANG C S; KIM M S; KIM S J
Patent Family (1 patents, 1 countries)

Patent			Application			
Number	Kind	Date	Number	Kind	Date	Update
KR 2004099692	A	20041202	KR 200331756	A	20030520	200526 B

Priority Applications (no., kind, date): KR 200331756 A 20030520

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
KR 2004099692	A	KO	1	10	

Alerting Abstract DESCRIPTION - In a **shear mode** of a mechanism using combined action modes of a rheological fluid, a plate(32) having...
...pole stator(31) and an S-pole stator(33) fixed to the ground. An MR(**Magneto - Rheological**) fluid is filled between the N-pole stator and the S-pole stator. A magnetic...

File 347:JAPIO Dec 1976-2006/Sep(Updated 061230)
(c) 2007 JPO & JAPIO
File 350:Derwent WPIX 1963-2006/UD=200705
(c) 2007 The Thomson Corporation

Set	Items	Description
S1	4753	(PROSTHESIS?? OR PROSTHESES?? OR IMPLANT??? OR PROSTHETIC?-?)(5N)(LEG?? OR ARM?? OR KNEE?? OR BODY()PART?? OR HAND?? OR -LIMB?? OR FOOT?? OR FEET??)
S2	591	(MAGNETO???? OR MAGNETIC???)(3N)(RHEOLO?????? OR RHEO()LOG-IC????)
S3	671	SHEAR????(2N)MODE??
S4	405854	BRAKE?? OR DAMP????
S5	37	AU=(HERR H? OR HERR, H? OR WILKENFELD A? OR WILKENFELD, A? OR BLECK O? OR BLECK, O?)
S6	486	MAGNETORHEOLOGIC?? OR MAGNETICRHEOLOGIC??
S7	3	S6 AND S3 AND S4
S8	4	S6 AND S3
S9	1	S8 NOT S7
S10	1	S6 AND S5
S11	0	S10 NOT S8

7/3,K/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0015280723 - Drawing available
WPI ACC NO: 2005-630853/200564
Related WPI Acc No: 2006-019875
XRPX Acc No: N2005-518028
Prosthetic control system e.g. for prosthetic knee, communicates configuration parameters of prosthetic device to controller using mobile computing device e.g. mobile telephone
Patent Assignee: BISBEE C R (BISB-I); ELLIOTT S B (ELLI-I); ODDSON M (ODDS-I); OESSUR ENG INC (OESS-N); OESSUR HF (OESS-N)
Inventor: BISBEE C R; BRISBEE C; ELLIOTT S B; ODDSON M; ELLIOTT S
Patent Family (3 patents, 108 countries)

Patent			Application			
Number	Kind	Date	Number	Kind	Date	Update
WO 2005087144	A2	20050922	WO 2005US8243	A	20050310	200564 B
US 20050283257	A1	20051222	US 2004551717	P	20040310	200603 E
			US 2004569511	P	20040507	
			US 2004569512	P	20040507	
			US 2004572996	P	20040519	
			US 2004624986	P	20041103	
			US 200577177	A	20050309	
EP 1734909	A2	20061227	EP 2005725431	A	20050310	200702 E
			WO 2005US8243	A	20050310	

Priority Applications (no., kind, date): US 2004551717 P 20040310; US 2004569511 P 20040507; US 2004569512 P 20040507; US 2004572996 P 20040519; US 2004624986 P 20041103; US 200577177 A 20050309

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
WO 2005087144	A2	EN	48	11	

National Designated States,Original: AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SM SY TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW
Regional Designated States,Original: AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IS IT KE LS LT LU MC MW MZ NA NL OA PL PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW

US 20050283257	A1	EN	Related to Provisional US 2004551717
			Related to Provisional US 2004569511
			Related to Provisional US 2004569512
			Related to Provisional US 2004572996
			Related to Provisional US 2004624986
EP 1734909	A2	EN	PCT Application WO 2005US8243
			Based on OPI patent WO 2005087144

Regional Designated States,Original: AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR

...NOVELTY - A controller controls a rotary **magnetorheological damper** of a prosthetic device operating in a **shear mode** . A mobile computing device e.g. mobile telephone is adapted to intermittently communicate the

configuration...

Original Publication Data by Authority

Original Abstracts:
A prosthetic or orthotic system including a **magnetorheological** (MR) **damper** . The MR **damper** may be configured to operate in **shear mode** . In one embodiment, the MR **damper** includes a rotary MR **damper** . A controller is configured to operate the **damper** . A mobile computing device may be adapted to intermittently communicate configuration parameters to the controller...

...A prosthetic or orthotic system including a **magnetorheological** (MR) **damper** . The MR **damper** may be configured to operate in **shear mode** . In one embodiment, the MR **damper** includes a rotary MR **damper** . A controller is configured to operate the **damper** . A mobile computing device may be adapted to intermittently communicate configuration parameters to the controller...

...A prosthetic or orthotic system including a **magnetorheological** (MR) **damper** . The MR **damper** may be configured to operate in **shear mode** . In one embodiment, the MR **damper** includes a rotary MR **damper** . A controller is configured to operate the **damper** . A mobile computing device may be adapted to intermittently communicate configuration parameters to the controller...
Claims:
1. A device configured to be attached to a limb, comprising:a **magnetorheological damper** operating in **shear mode** ;a controller configured to operate the **damper** ; anda mobile computing device adapted to intermittently communicate configuration parameters to the controller.

7/3,K/2 (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0014621822
WPI ACC NO: 2004-803810/200479
Related WPI Acc No: 2006-019875; 2006-262954; 2006-314692; 2006-549036; 2006-668057
XRAM Acc No: C2004-280478
Magnetorheological **fluid useful in prosthetic joints comprises iron particles and a fluid component containing a carrier fluid and additive optionally in combination with prosthetic knee**
Patent Assignee: BISBEE C R (BISB-I); HSU H (HSUH-I); LINDSAY M W (LIND-I); LUKASIEWICZ R J (LUKA-I); OESSUR ENG INC (OESS-N); PALMER M L (PALM-I); PRINCE S W (PRIN-I)
Inventor: BISBEE C; BISBEE C R; HSU H; LINDSAY M; LINDSAY M W; LUKASIEWICZ R; LUKASIEWICZ R J; PALMER M L; PRINCE S; PRINCE S W
Patent Family (6 patents, 106 countries)

Patent Number	Kind	Application Date	Number	Kind	Date	Update
US 20040217324	A1	20041104	US 2003467722	P	20030502	200479 B
			US 2003722313	A	20031125	
WO 2004100191	A1	20041118	WO 2003US37848	A	20031126	200479 E

AU 2003295965 A1 20041126 AU 2003295965 A 20031126 200510 E
EP 1620866 A1 20060201 EP 2003787180 A 20031126 200612 E
WO 2003US37848 A 20031126
US 7101487 B2 20060905 US 2003722313 A 20031125 200659 E
JP 2006525650 W 20061109 WO 2003US37848 A 20031126 200675 E
JP 2004571721 A 20031126

Priority Applications (no., kind, date): US 2003467722 P 20030502; US 2003722313 A 20031125

Patent Details

Number Kind Lan Pg Dwg Filing Notes
US 20040217324 A1 EN 17 6 Related to Provisional US 2003467722
WO 2004100191 A1 EN
National Designated States,Original: AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW
Regional Designated States,Original: AT BE BG BW CH CY CZ DE DK EA EE ES FI FR GB GH GM GR HU IE IT KE LS LU MC MW MZ NL OA PT RO SD SE SI SK SL SZ TR TZ UG ZM ZW
AU 2003295965 A1 EN Based on OPI patent WO 2004100191
EP 1620866 A1 EN PCT Application WO 2003US37848
Based on OPI patent WO 2004100191
Regional Designated States,Original: AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
JP 2006525650 W JA 25 PCT Application WO 2003US37848
Based on OPI patent WO 2004100191

Magnetorheological **fluid useful in prosthetic joints comprises iron particles and a fluid component containing a carrier...**

Original Titles:

MAGNETORHEOLOGICAL FLUID COMPOSITIONS AND PROSTHETIC KNEES UTILIZING SAME

...

... **MAGNETORHEOLOGICAL** FLUID COMPOSITIONS AND PROSTHETIC KNEES UTILIZING SAME...

... **Magnetorheological** fluid compositions and prosthetic knees utilizing same...

... **Magnetorheological** fluid compositions and prosthetic knees utilizing same...

... **MAGNETORHEOLOGICAL** FLUID COMPOSITIONS AND PROSTHETIC KNEES UTILIZING SAME

Alerting Abstract ...NOVELTY - A **magnetorheological** fluid comprises iron particles and a fluid component containing a carrier fluid and an additive...
USE - In prosthetic joints, in controllable braking systems for prosthetic knee joints, **magnetorheological** knee **brakes** or actuators...

...ADVANTAGE - The **magnetorheological** fluid is operable over a temperature of 10 - 115(deg)F. The carrier fluid has...

...deg)C; and has a % volatility of 0.01 - 20% at 121(deg)C. The **magnetorheological** fluid exhibits low off-state viscosity and thus low off-state torque as torque is...

Technology Focus

...1 - 60 (preferably 10 - 50, especially 20 - 40) vol./vol.%. The prosthetic knee operates in **shear mode** .

...

...1 - 60 (preferably 10 - 50, especially 20 - 40) vol./vol.%. The prosthetic knee operates in **shear mode** .

Extension Abstract

EXAMPLE - A **magnetorheological** fluid comprising (vol./vol.%): BASF (carbonyl iron powder) particle of 0.5 - 2 mu size...

Original Publication Data by Authority

Original Abstracts:

The present invention relates in one embodiment to **magnetorheological** fluids utilized in prosthetic joints in general and, in particular, to **magnetorheological** fluids utilized in controllable braking systems for prosthetic knee joints. Preferred **magnetorheological** fluids of the present invention comprises polarizable iron particles, a carrier fluid, and optionally an...

...The present invention relates in one embodiment to **magnetorheological** fluids utilized in prosthetic joints in general and, in particular, to **magnetorheological** fluids utilized in controllable braking systems for prosthetic knee joints. Preferred **magnetorheological** fluids of the present invention comprises polarizable iron particles, a carrier fluid, and optionally an...

...The present invention relates in one embodiment to **magnetorheological** fluids utilized in prosthetic joints in general and, in particular, to **magnetorheological** fluids utilized in controllable braking systems for prosthetic knee joints. Preferred **magnetorheological** fluids of the present invention comprises polarizable iron particles, a carrier fluid, and optionally an...

...The present invention relates in one embodiment to **magnetorheological** fluids utilized in prosthetic joints in general and, in particular, to **magnetorheological** fluids utilized in controllable braking systems for prosthetic knee joints. Preferred **magnetorheological** fluids of the present invention comprises polarizable iron particles, a carrier fluid, and optionally an...

Claims:

What is claimed is:1. A **magnetorheological** fluid comprising iron particles and a fluid component,wherein the fluid component comprises a carrier...

...What is claimed is:1. A **magnetorheological** fluid comprising polarizable particles and a fluid component, wherein the fluid component comprises a carrier...

*****

7/3,K/3 (Item 3 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0011200786 - Drawing available
WPI ACC NO: 2002-139205/200218
XRPX Acc No: N2002-104950
Magnetorheologically actuated rotary prosthetic knee has gap between stators and rotors in which magnetorheological **fluid is filled whose viscosity is changed by electromagnet positioned between core, stator and rotor**
Patent Assignee: DEFFENBAUGH B W (DEFF-I); HERR H M (HERR-I); MASSACHUSETTS INST TECHNOLOGY (MASI); PRATT G A (PRAT-I); WITTIG M B (WITT-I)
Inventor: DEFFENBAUGH B W; DEFFENBAUGH W; HERR H M; HERR M; PRATT A; PRATT G A; WITTIG B; WITTIG M B
Patent Family (14 patents, 93 countries)

Patent Number	Kind	Date	Application Number	Kind	Date	Update
WO 2001054630	A1	20010802	WO 2001US2115	A	20010122	200218 B
AU 200131063	A	20010807	AU 200131063	A	20010122	200218 E
US 20010029400	A1	20011011	US 2000177108	P	20000120	200218 E
			US 2001767367	A	20010122	
EP 1255517	A1	20021113	EP 2001903215	A	20010122	200282 E
			WO 2001US2115	A	20010122	
JP 2003521316	W	20030715	JP 2001555610	A	20010122	200347 E
			WO 2001US2115	A	20010122	
US 6764520	B2	20040720	US 2000177108	P	20000120	200448 E
			US 2001767367	A	20010122	
AU 771817	B2	20040401	AU 200131063	A	20010122	200455 E
CN 1498095	A	20040519	CN 2001805955	A	20010122	200455 E
EP 1255517	B1	20050803	EP 2001903215	A	20010122	200551 E
			WO 2001US2115	A	20010122	
DE 60112403	E	20050908	DE 60112403	A	20010122	200561 E
			EP 2001903215	A	20010122	
			WO 2001US2115	A	20010122	
RU 2266722	C2	20051227	WO 2001US2115	A	20010122	200603 E
			RU 2002118693	A	20010122	
ES 2247057	T3	20060301	EP 2001903215	A	20010122	200618 E
DE 60112403	T2	20060601	DE 60112403	A	20010122	200637 E
			EP 2001903215	A	20010122	
			WO 2001US2115	A	20010122	
CN 1237949	C	20060125	CN 2001805955	A	20010122	200655 E

Priority Applications (no., kind, date): US 2001767367 A 20010122; US 2000177108 P 20000120
Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
WO 2001054630	A1	EN	66	51	

National Designated States,Original: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN

IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
Regional Designated States,Original: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW
AU 200131063 A EN Based on OPI patent WO 2001054630
US 20010029400 A1 EN Related to Provisional US 2000177108
EP 1255517 A1 EN PCT Application WO 2001US2115
Based on OPI patent WO 2001054630
Regional Designated States,Original: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR
JP 2003521316 W JA 152 PCT Application WO 2001US2115
Based on OPI patent WO 2001054630
US 6764520 B2 EN Related to Provisional US 2000177108
AU 771817 B2 EN Previously issued patent AU 200131063

Based on OPI patent WO 2001054630
EP 1255517 B1 EN PCT Application WO 2001US2115
Based on OPI patent WO 2001054630
Regional Designated States,Original: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
DE 60112403 E DE Application EP 2001903215
PCT Application WO 2001US2115
Based on OPI patent EP 1255517
Based on OPI patent WO 2001054630
RU 2266722 C2 RU PCT Application WO 2001US2115
Based on OPI patent WO 2001054630
ES 2247057 T3 ES Application EP 2001903215
Based on OPI patent EP 1255517
DE 60112403 T2 DE Application EP 2001903215
PCT Application WO 2001US2115
Based on OPI patent EP 1255517
Based on OPI patent WO 2001054630

Magnetorheologically actuated rotary prosthetic knee has gap between stators and rotors in which magnetorheological **fluid is filled whose viscosity is changed by electromagnet positioned between core, stator and rotor**

Alerting Abstract ...NOVELTY - Alternate soft stators (230) and rotors (220) has gap filled with **magnetorheological** fluid. An electromagnet (214) between core (212), rotors and stators generates variable magnetic field to...
...Controllable **magnetorheological brake** ; Prosthetic knee assembly; Controllable rotary **damper** ; Prosthetic knee rotation control method...

...ADVANTAGE - By operating in the **shear mode** , there is no pressure build-up within the actuated prosthetic knee, thus eliminating the chances
...

Original Publication Data by Authority

Original Abstracts:
...a plurality of interspersed and alternating rotors (120, 220) and stators (130, 230) to shear **magnetorheological** fluid (130) in gaps formed therebetween. Advantageously, by operating in the " **shear mode** " there is

substantially no or negligible fluid pressure buildup or change. Moreover, the multiple MR...

...frictional torque component, thereby forming a "hybrid" braking system which provides a total torque or **damping** which is a combination of viscous torque and frictional torque...

...prosthetic knee which utilizes a plurality of interspersed and alternating rotors and stators to shear **magnetorheological** fluid in gaps formed therebetween. Advantageously, by operating in the " **shear mode** " there is substantially no or negligible fluid pressure buildup or change. Moreover, the multiple MR...

...frictional torque component, thereby forming a "hybrid" braking system which provides a total torque or **damping** which is a combination of viscous torque and frictional torque...

...prosthetic knee which utilizes a plurality of interspersed and alternating rotors and stators to shear **magnetorheological** fluid in gaps formed therebetween. Advantageously, by operating in the " **shear mode** " there is substantially no or negligible fluid pressure buildup or change. Moreover, the multiple MR...

...frictional torque component, thereby forming a "hybrid" braking system which provides a total torque or **damping** which is a combination of viscous torque and frictional torque...

...a plurality of interspersed and alternating rotors (120, 220) and stators (130, 230) to shear **magnetorheological** fluid (130) in gaps formed therebetween. Advantageously, by operating in the " **shear mode** " there is substantially no or negligible fluid pressure buildup or change. Moreover, the multiple MR...

...frictional torque component, thereby forming a "hybrid" braking system which provides a total torque or **damping** which is a combination of viscous torque and frictional torque...

Claims:

...420, 520) and stators (130, 230, 430, 530) during knee rotation generates a variable knee **damping** torque...

...rotors and magnetically soft stators arranged to form a plurality of gaps therebetween containing a **magnetorheological** fluid which is sheared during knee rotation;an electromagnet positioned between said core and said ...

...generate a variable magnetic field to cause a controlled change in the viscosity of said **magnetorheological** fluid; anda pair of bearings in rotary communication with said rotors and a shin...

9/3,K/1 (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX

0013703494 - Drawing available
WPI ACC NO: 2003-800610/
XRPX Acc No: N2003-641507
Engine valve actuating mechanism, has lost motion device with magnetorheological **fluid that is maintained between closely opposing surfaces of device, where flux is applied to control fluid resistance**
Patent Assignee: GENERAL MOTORS CORP (GENK)
Inventor: BARTOS A L; GECIM B A; VAHABZADEH H
Patent Family (1 patents, 1 countries)

Patent			Application			
Number	Kind	Date	Number	Kind	Date	Update
US 6637387	B1	20031028	US 2002243092	A	20020913	200375 B

Priority Applications (no., kind, date): US 2002243092 A 20020913

Patent Details

Number	Kind	Lan	Pg	Dwg	Filing Notes
US 6637387	B1	EN	11	9	

Engine valve actuating mechanism, has lost motion device with magnetorheological **fluid that is maintained between closely opposing surfaces of device, where flux is applied to...**

Original Titles:
Variable valve actuating mechanism with **magnetorheological** fluid lost motion device
...has a valve (18) driven by an actuator. A lost motion device (22) contains a **magnetorheological** (MR) fluid (36) between the actuator and valve. The device controls transmission of the valve...

Original Publication Data by Authority

Original Abstracts:
Variable valve mechanisms utilize **magnetorheological** fluid (MRF) in lost motion devices for controlling lift and timing of engine valves and the like. The lost motion devices are designed with either of two operational **modes**, a direct **shear mode** and a valve **mode**. In the **shear mode**, the MR fluid is retained between relatively movable shear surfaces of a lost motion device...
Claims:
...a support carrying both the actuator and the valve; and a lost motion device containing **magnetorheological** (MR) fluid disposed in the mechanism between the actuator and one of the valve and...

File 9:Business & Industry(R) Jul/1994-2007/Jan 19
(c) 2007 The Gale Group
File 16:Gale Group PROMT(R) 1990-2007/Jan 19
(c) 2007 The Gale Group
File 160:Gale Group PROMT(R) 1972-1989
(c) 1999 The Gale Group
File 148:Gale Group Trade & Industry DB 1976-2007/Jan 12
(c)2007 The Gale Group
File 621:Gale Group New Prod.Annou.(R) 1985-2007/Jan 11
(c) 2007 The Gale Group
File 441:ESPICOM Pharm&Med DEVICE NEWS 2007/Jul W3
(c) 2007 ESPICOM Bus.Intell.
File 149:TGG Health&Wellness DB(SM) 1976-2007/Jan W1
(c) 2007 The Gale Group
File 15:ABI/Inform(R) 1971-2007/Jan 19
(c) 2007 ProQuest Info&Learning
File 624:McGraw-Hill Publications 1985-2007/Jan 19
(c) 2007 McGraw-Hill Co. Inc
File 635:Business Dateline(R) 1985-2007/Jan 19
(c) 2007 ProQuest Info&Learning
File 636:Gale Group Newsletter DB(TM) 1987-2007/Jan 19
(c) 2007 The Gale Group
File 135:NewsRx Weekly Reports 1995-2007/Jan W2
(c) 2007 NewsRx
File 98:General Sci Abs 1984-2007/Jan
(c) 2007 The HW Wilson Co.
File 275:Gale Group Computer DB(TM) 1983-2007/Jan 19
(c) 2007 The Gale Group
File 647:CMP Computer Fulltext 1988-2007/Mar W3
(c) 2007 CMP Media, LLC
File 674:Computer News Fulltext 1989-2006/Sep W1
(c) 2006 IDG Communications

Set	Items	Description
S1	7897	(PROSTHESIS?? OR PROSTHESES?? OR IMPLANT??? OR PROSTHETIC?-?)(5N)(LEG?? OR ARM?? OR KNEE?? OR BODY()PART?? OR HAND?? OR -LIMB?? OR FOOT?? OR FEET??)
S2	247	(MAGNETO???? OR MAGNETIC???)(3N)(RHEOLO?????? OR RHEO()LOG-IC????)
S3	998	SHEAR????(2N)MODE??
S4	289056	BRAKE?? OR DAMP????
S5	33	AU=(HERR H? OR HERR, H? OR WILKENFELD A? OR WILKENFELD, A? OR BLECK O? OR BLECK, O?)
S6	0	S1(S)S2(S)S3(S)S4
S7	3	S1 AND S2 AND S3 AND S4
S8	3	RD (unique items)
S9	0	S5 AND S2
S10	267	MAGNETORHEOLOGIC??
S11	2	S10(S)S3(S)S4
S12	2	RD (unique items)
S13	2	S12 NOT S7
S14	1	S13 AND S1
S15	1	S13 NOT S14

8/3,K/1 (Item 1 from file: 9)
DIALOG(R)File 9:Business & Industry(R)

03576046 Supplier Number: 128606074 (USE FORMAT 7 OR 9 FOR FULLTEXT)
The new wave in shock absorbers: the promise of an old idea is finally fulfilled with a new innovation in technology.
(Shock Absorbers)
Aftermarket Business, v 114, n 11, p 94
November 2004
DOCUMENT TYPE: Journal ISSN: 0892-1121 (United States)
LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 1762

(USE FORMAT 7 OR 9 FOR FULLTEXT)

TEXT:
...by its supplier Delphi Automotive Systems, it uses a computer to adjust the shock absorbers' **damping** rate. While electronic **damping** adjustment is nothing new, the shock absorbers themselves are different from anything you've seen...
A hydraulic shock absorber **dampens** suspension movement by forcing a piston to move through oil. Holes in the piston are...

...spring-loaded valves. These valves slow the flow of oil through the holes to control **damping** rate: the smaller the valve opening, the slower the oil flow and the greater the **damping** . Adjustable shock absorbers vary the shock's **damping** rate by varying the size of the valve opening, either by adjusting the spring preload...

...oil flow orifice. By using a small motor or a solenoid to operate the valve, **damping** rate can be adjusted "on-the-fly" by the driver and/or by the computer...

...viscosity on-the-fly presents some exciting possibilities that go far beyond adjustable shock absorbers.

Magneto - rheological fluid

Rheology is a science that studies the deformation and flow of materials. Rheological fluids have flow...

...It has been tested in a wide range of applications, from torque converters, clutches and **dampers** to synthetic muscles and **dampers** in powered **prosthetic arms** and **legs** . It works, but its shear strength--that is, its resistance to shearing movement--is limited...

...in research and development, ER fluid is still far from ready for any practical applications.

Magneto - rheological (MR) fluid has a shear strength about 10 times stronger than ER fluid. Invented at...

...For instance, in addition to automotive uses, MR fluids have been developed for use in **dampers** that protect buildings and other structures from earthquake damage. These **dampers** sit still for long periods, so different additives are needed to keep the particles in...

...control applications control relative movement of adjacent parts, such as in torque converters, clutches and **brakes** . In valve control mode, it can be used in place of any kind of flow...

...haul truck seats, shocks, struts and air-inflated load-leveling shocks.

Control system
Because adjustable **damping** has been around for a while, all of the other bits and pieces needed for...

...to control body roll during any maneuver. The system also checks body movement during antilock **brake** system (ABS) operation using vehicle speed, wheel speed and other data supplied by the ABS...

...a strong enough magnetic field. Several companies and universities are experimenting with using it in **brakes** and fluid couplings. The most common design uses two plates facing each other in a...

...the strength of the applied field current. With one shaft held stationary, it's a **brake** for the other shaft. With one shaft as input and the other as output, full...

...applied to use the assembly as a clutch. These applications use the MR fluid in **shear mode** as opposed to valve **mode** , so its **shear** strength is what limits the amount of torque that can be transferred.

So far, the automotive use of MR fluid is limited to shock absorbers and seat **dampers** for cars and trucks, but active motor mounts are on the way. Other ideas in development include off-road racer Rod Millen's work to develop a **damping** system to increase high-speed off-road capabilities of the Army's HMMWV. Dana Corp. is developing a center bearing mount for long driveshafts using an MR fluid **damper** , and also a viscous driveline coupling using an MR fluid clutch. Several companies that make...

...and precise positioning of heavier loads.

Non-automotive applications already in production include the structural **dampers** mentioned earlier. In addition to earthquake protection, they control wind-induced motion of bridges and...

...micro-finish never attained before. There are even non-industrial applications. Nautilus uses MR fluid **brakes** on some of its home exercise machines.

All new inventions need time to mature enough...

8/3,K/2 (Item 1 from file: 148)

0018380832 SUPPLIER NUMBER: 128606074 (USE FORMAT 7 OR 9 FOR FULL TEXT)

The new wave in shock absorbers: the promise of an old idea is finally fulfilled with a new innovation in technology.(Shock Absorbers)

Gordon, Jacques

Aftermarket Business, 114, 11, 94
Nov, 2004
ISSN: 0892-1121 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 1916 LINE COUNT: 00150

TEXT:

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...oil flow orifice. By using a small motor or a solenoid to operate the valve, **damping** rate can be adjusted "on-the-fly" by the driver and/or by the computer...

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8/3,K/3 (Item 2 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

0017259793 SUPPLIER NUMBER: 120035850 (USE FORMAT 7 OR 9 FOR FULL TEXT)
The new wave in shock absorbers: the promise of an old idea is finally fulfilled.
Gordon, Jacques
Motor Age, 123, 7, 26(4)
July, 2004
ISSN: 1520-9385 LANGUAGE: English RECORD TYPE: Fulltext
WORD COUNT: 1942 LINE COUNT: 00153

TEXT:

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?

14/3,K/1 (Item 1 from file: 15)
DIALOG(R)File 15:ABI/Inform(R)

02688494 295004101
User-adaptive control of a magnetorheological prosthetic knee
Herr, Hugh; Wilkenfeld, Ari
Industrial Robot v30n1 PP: 42-55 2003
ISSN: 0143-991X JRNL CODE: IRO
WORD COUNT: 5996

User-adaptive control of a magnetorheological prosthetic knee

ABSTRACT: A magnetorheological **knee prosthesis** is presented that automatically adapts **knee** damping to the gait of the amputee using only local sensing of knee force, torque, and position. To assess the clinical effects of the user-adaptive **knee prosthesis** , kinematic gait data were collected on four unilateral trans-femoral amputees. Using the user-adaptive...
TEXT: Keywords

Control, Medical

Abstract

A magnetorheological **knee prosthesis** is presented that automatically adapts **knee** damping to the gait of the amputee using only local sensing of knee force, torque, and position. To assess the clinical effects of the user-adaptive **knee prosthesis** , kinematic gait data were collected on four unilateral trans-femoral amputees. Using the user-adaptive...

...wars, Lord Uxbridge, Wellington's cavalry officer at Waterloo, wore a hinge-type trans-femoral **prosthesis** that even dorsiflexed the **foot** , as the knee flexed, to reduce stumbling during the swing phase. Although the hinge-type...

...1970), it was not until the 1970s that researchers began developing highly adaptive, electronically-controlled **prosthetic knees** .

Electronic **knees** use some form of computational intelligence to control the resistive torque or damping about the...
...worked on controller designs based on the concept of "echoing" the actions of the sound **leg** to control the **prosthetic leg** . Following Flowers' seminal work, Kautz and Seireg (1980) and later Bar et al. (1983) also...

...controllers, laboratory researchers also experimented with electromyographic signals in the control of a trans-femoral **knee prosthesis** . Myers and Moskowitz (1981, 1983) and Triolo and Moskowitz (1982) worked with electromyographic voluntary control of a **knee prosthesis** , as did Peeraer et al. (1989) and later Aeyels et al. (1995). Academic research not...

...et al. (1991) worked on using output space Lyapunov tracking for control of an active **knee prosthesis** while Ju et al. (1995) attempted to use "fuzzy logic" for the same purpose.

Motivated...

...fast speeds. For each participant, the user-adaptive electronic knee and a passive, non-adaptive **knee prosthesis** are tested, and the results are compared to the gait kinematics of twelve age, weight and height matched normals.

Materials and methods

Magnetorheological **knee prosthesis** : actuator, sensors, microprocessor and battery .

To investigate user-adaptive control schemes and their effect on trans-femoral amputee gait, a variable-damper **knee prosthesis** was developed. The device, shown in Figure 1, is self-contained with (1) actuator, (2...

...sensors, microprocessor and battery are described.

Actuator design

Many brake technologies have been developed for **prosthetic knee** applications including hydraulic, pneumatic, friction, and magnetorheological (MR) damping strategies (Popovic and Sinkjaer, 2000). In ...

...magnetic field was controlled within the magnetic circuit and thus the level of MR knee **damping** .

In Figure 1 (B), a coronal section of the knee's magnetic circuit is sketched...

...the knee actuator technology, see Deffenbaugh et al. (2001).

Sensors, microprocessor and battery

To control **knee** resistive torque, the **prosthesis** of this investigation used only local mechanical sensing of knee position, force and torque. Here ...

...two aft and two fore strain gages) measured the component of force applied to the **knee prosthesis** from the ground in the direction of the knee's longitudinal axis (add fore and aft strain gage signals). The axial force measurement was critical for determining whether the **prosthetic foot** was on or off the ground. The strain gage sensors were also used to measure...

...the amputee's load line was posterior to the knee's rotational axis and the **knee prosthesis** was at risk of buckling. In distinction, during late stance, when only the toe was...

...sensor measured a negative extension moment, denoting that the load line was anterior to the **knee** 's rotational axis and the **prosthesis** was not at risk of buckling. As will be described in the next section, the...

...was used for computation, and four rechargeable lithium ion batteries were employed for power.

MR **knee prosthesis** : control algorithm

Description of normal, level-ground walking: To describe how the electronic **knee prosthesis** was controlled, the basic walking progression must first be explained. There are five distinct phases...

...States and transitional conditions

These basic phases of biological gait suggested the framework of the **prosthetic knee** controller as a state machine. Each phase (one through five) corresponded to a state. Figure...

...extends throughout early to midstance (see Figure 2). In State 1, or Stance Flexion, the **prosthetic knee** applied a relatively high level of damping (B in equation 1) to inhibit the knee from buckling under the user's weight. The **prosthetic knee** also applied high damping during the extension period of stance, or State 2, to slow or damp knee extension so that the rotating portion of the **knee** did not slam against the **prosthetic** kneecap at full **knee** extension. In this investigation, the four amputee participants were able to extend their knee by actively extending their hip with the **prosthetic foot** firmly positioned on the ground.

Figure 2

The degree to which the electronic knee damped...

...parameter that changed monotonically with locomotory speed. In this investigation, the amount of time the **prosthetic foot** remained in contact with the ground or foot contact time, was used. As amputee participants...

...control the maximum flexion angle in State 4. When the amputee participants first used the **knee prosthesis** controlled by this scheme, State 4 damping was set equal to zero (zero electromagnet current...

...essential that the same prosthetist align each subject to decrease differences in alignment style. Each **knee prosthesis** was aligned such that the load line passed posterior to the knee axis (0.5...the level of gait symmetry.

Results

Early stance knee flexion

When using the user-adaptive **knee prosthesis** , all four amputee participants demonstrated early stance knee flexion. At the self-selected walking speed...

...there was generally poor agreement between the unimpaired knee data and the data from both **prosthetic knees** . However, for these amputee participants, the maximum swing flexion angle was always below the 70 degree biological threshold even when using the mechanically passive **knee**

prosthesis .

Discussion

In order for individuals suffering from transfemoral amputation to walk in a variety of circumstances, an external **knee prosthesis** must provide stance control to limit buckling when weight is first applied to the **prosthesis** . In addition, a **knee prosthesis** must provide swing phase control so that biologically realistic leg dynamics emerge during swing. Unlike a biological **leg** , an external **knee prosthesis** , using only local mechanical sensing, must accomplish both stance and swing control without direct knowledge...

...amputee decides to lift a suitcase or change to a heavier shoe.

Using commercially available **prosthetic knee** technology, a prosthetist must program knee damping levels until a knee is comfortable, moves naturally...

...levels may not adapt properly in response to environmental disturbances. In this study, a MR **knee prosthesis** is presented that automatically modulates **knee** damping values to match the amputee's gait requirements, accounting for variations in forward speed...

...for amputees to walk with an increased level of biological realism compared to mechanically passive **prosthetic** systems.

Dissipative **knees** and swing phase gait symmetry
Although the peak swing flexion angles measured from amputee participants ...

...active where both knee damping and power generation are modulated throughout a walking cycle.

Active **knee prostheses**

Figure 6

Figure 7

Figure 8

In their groundbreaking work, Popovic and Schwirtlich (1988) developed an active trans-femoral **prosthesis** called the Belgrade **Knee** . With this system, both knee dissipation and mechanical power generation could be controlled throughout a...

...the onboard battery had to be recharged (Popovic and Kalanovic, 1993). In contrast, variable-damper **knee prostheses** such as the user-adaptive system presented here, are more energy efficient, allowing amputees to... ...be effectively controlled in the context of a low-mass, high fatigue-life, commercially viable **knee prosthesis** . Another important area of research will be to combine local mechanical sensing about an external **prosthetic knee** with peripheral and/or central neural sensors positioned within the body. Neural prostheses such as...

...for amputees to walk with an increased level of biological realism compared to mechanically passive **prosthetic** systems. The user-adaptive **knee** successfully controlled early stance damping, enabling the amputee participants to undergo biologically-realistic, early-stance...

...participants for their time and patience. This research was supported by Ossur, a manufacturer of **leg prostheses** .

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15/3,K/1 (Item 1 from file: 15)
DIALOG(R)File 15:ABI/Inform(R)

02302842 84988022
Micro-actuators: not so small any more
Monkman, Gareth
Assembly Automation v18n4 PP: 286 1998
ISSN: 0144-5154 JRNL CODE: AAU
WORD COUNT: 1700

...TEXT: long been known. Researchers at the University of Saarbrucken have also been conducting experiments with **magnetorheological** fluids in the so called "squeeze mode". Though perhaps not capable of such high plasticity as electrorheological fluids under the same conditions, **magnetorheological** fluids can be used in this way to produce very effective short-stroke **dampers** . Moreover, the flexibility of **magnetorheological** fluids lends itself well to the combining of both **shear mode** and squeeze mode effects for the construction of controllable broad bandwidth **damping** systems.

Though eclipsed a little by these recent industrial developments in magnetorheological fluids technology, electrorheological...

...these new developments in electrorheological fluids, together with mechanical design simplicity, a cost-effective flow/ **shear mode damper** has been created. Successful testing by Darmstadt University has shown that they outperform all conventional...
?